

ENHANCEMENT MODE MESFET FROM FREE-STANDING POLYCRYSTALLINE DIAMOND GROWN BY HIGH POWER DC ARC PLASMA JET CVD

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Abstract

Metal-semiconductor field-effect transistors (MESFETs) have been fabricated using the P-type layer surface conductive of undoped free-standing polycrystalline diamond grown by high power DC arc plasma jet (HPDAPJ) CVD, bring a large area and rapid deposition technique. Raman analysis revealed only the presence of a sharp peak at 1333 cm^{-1} , indicating good quality diamond.

The Au-Au I-V curve exhibits reasonably “Ohmic” characteristics and has been used for the source and drain electrode-contacts. The Al-Al measurements showed little current flow, as is typical for two back-to-back Schottky diodes. The Al-Au curve reveals strong current rectification indicating a Schottky barrier and used for the gate-electrode-contacts.

The MESFETs samples showed I-V characteristics similar to that fabricated using undoped homepitaxial diamond grown by microwave plasma-assisted CVD. A detailed discussion is given in the paper of the measured results, and it is expected that optimized forms of the MESFETs from HPDAPJ CVD diamond would appear to offer a commercially viable route to high-performance diamond-based device development.

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